**Academic Session 2020-21**

**Home Assignment – I**

**Subject: Chemistry**

**Class: XII**

## Chapter - Solution

## Numerical Questions

1. Calculate the molarity and normality of a solution containing 9.8g of $H_2SO_4$ in 250$cm^3$ of the solution?
2. What is the concentration of glucose in mol $L^{-1}$ of it is dissolved in enough water to make a final volume up to 2L?
3. Calculate the normality of a solution of $FeSO_4.H_2O$ containing 2.4/100ml (Fe=56, S=32, O=16, H=1) which converts to ferric form in a reaction.
4. Calculate the mole fraction of Ethylene glycol($C_2H_6O_2$) and water in a solution containing 20% of $C_2H_6O_2$ by mass.
5. A solution contains 25% water 25% ethanol and 50 percent acetic by mass. Calculate the mole fraction of each component.
6. Calculate the number of milliequivalent gram eq. weight in grams and number of moles contained in 10 litres of 0.5 M $Ba(OH)_2$ solution. (Ba=137)
7. If $N_2$ gas is bubbled through water at 293K how many millimoles of $N_2$ gas would be dissolved in 1 litre of water? Assume that $N_2$ exerts a partial pressure of 0.987 bar. Given that Henry's law constant for $N_2$ at 293 K is 76.48 Kbar
8. What is the strength in grams per litre of a solution of $H_2SO_4$, 12cc of which neutralizes 15 CC of N/10 NaOH solution?
9. 2.82 gram of glucose (mol. Mass=180) are dissolved in 30 gram of water. Calculate the (i) molality of solution (ii) mole fraction of Glucose, water
10. At what partial pressure, Oxygen will have a solubility of 0.05g $L^{-1}$ in water at 293K? Henry's constant($K_H$) for $O_2$ in water at 293K is 34.86 Kbar. Assume the density of the solution to be same as that of the solvent.
11. 100 mL of 0.6 $NH_2SO_4$ and 200 mL of 0.3 NHCl were mixed together. What will be the normality of the resulting solution?
12. Calculate the number of molecules of oxalic acid ($CH_2C_2O_4.2H_2O$) in 100ml of 0.2N Oxalic acid solution.
13. The mole fraction of helium in a saturated solution at 20C is $1.2x10^{-6}$. Find the pressure of helium above the solution. Given Henry's constant at 20C=144.97 Kbar
14. Methanol and ethanol form nearly ideal solution at 300K. A solution is made by mixing 32g methanol and 23g ethanol at 300K. Calculate the partial pressure of its constituents and the total pressure of the solution.
    Given: At 300K, $PCH_3OH$= 90 mm Hg, $PC_2H_5OH$= 51mm Hg.
15. What will be the normality of the resulting solution of example 10 if it is diluted to 600 mL?

16. What concentration of nitrogen should be present in a glass of water at room temperature? Assume a temperature of 25C, a total pressure of 1 atmosphere and mole fraction of nitrogen in air as 0.78 [$K_H$ for nitrogen=8.42x $10^{-7}$ M/mm Hg]
17. Vapour pressure of two liquids A and B are 120 and 180 mm Hg at a given temperature. I/2 mole of A and 3 mole of B are mixed to form an ideal solution, calculate the vapour pressure of solution at the same temperature.
18. One gram-atom of Ca was burnt in excess of oxygen and the oxide was dissolved in water to make up a 1-litre solution. Calculate the normality of the alkaline solution.
19. Vapour pressure of water at 293 K is 17.51 mm. lowering of vapour pressure of a sugar solution is 0.0614 mm. calculate (i) relative lowering of vapour pressure (ii) vapour pressure of the solution (iii) mole fraction of water.
20. 5g of NaCl is dissolved in 1000g of water. If the density of the resulting solution is 0.991g per cc, calculate the molality, molarity, normality and mole fraction of the solute.
21. The vapour pressure of a 5% aqueous solution of a non-volatile organic substance at 373K is 745mm. calculate the molar mass of the solute.
22. A solution of ethanol in water is 10% by volume. If the solution and pure ethanol have densities of 0.9866g/cc and 0.785g/cc respectively, find the percent by weight.
23. A current of dry air was passed through a solution of 2.5g of a non-volatile substance in 100g of water and then through water alone. The loss of weight of the former was 1.25g and that of the latter was 0.05g. calculate:
    (i) mole fraction of the solute in the solution (ii) molecular weight of the solute
24. Calculate the osmotic pressure at 17° C of an aqueous solution containing 1.75g of sucrose per 150 mL solution.
25. The osmotic pressure of a non- volatile solution in $C_6H_6$ at 25° C is 20.66 $Nm^{-2}$ .If the solution had a concentration of 2g/$dm^3$, what is mol. Wt. of solute?
26. At 27° C, 36g of glucose per litre has an O.P. of 4.92 atm. If the osmotic pressure of solution is 1.5 atm at the same temperature, what should be its concentration?
27. 2.5g of a substance is present in 200mL of solution showing the osmotic pressure of 60cm Hg at 15°C. Calculate the molecular weight of substance. What will be the osmotic pressure if temperature is raised to 25°C?
28. Calculate O.P. of a solution obtained by mixing 100 mL of 3.4% solution (wt./vol.) of urea (m. wt. 60) and 100mL of 1.6% solution (wt./vol.) of cane sugar (m. wt. 342) at 20°C.
29. A 10g mixture of glucose and urea present in 250 mL solution shows the osmotic pressure of 7.4 atm at 27°C. Calculate % composition of mixture.
30. At 25°C, a solution containing 0.2g of polyisobutylene in 100 mL of benzene developed a rise of 2.4mm at osmotic equilibrium. Calculate the molecular weight of polyisobutylene if the density of solution is 0.88g/mL.

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